

It passed directly eastward over Kansas and Missouri during the 17th and 18th as an extended depression of slight energy, although attended by severe local storms and general rains in districts east of the Mississippi river. The barometer was from one to three-tenths of an inch below the mean for the month in these districts, with local depressions in the Ohio valley and middle Atlantic states on the 19th. It passed to the east of the New England coast, where the course changed to the northward, carrying it over the Maritime Provinces with increased energy, and violent gales at the most northerly stations.

VIII.—This storm approached the stations from the north Pacific coast on the 18th, and was clearly traced from that coast across the Rocky mountains to Colorado, where it was central on the 21st. It was the most marked barometric depression of the month, the barometer reaching its minimum when the disturbance was central in Colorado on the morning of the 21st, when it read 28.88, at West Las Animas. After remaining about stationary during the 21st, it continued its southeasterly course during the 22d, causing a secondary depression to form in southeastern Kansas, while the principal disturbance was central near Cairo, Illinois. Violent local storms and tornadoes occurred in the south and east quadrants of this depression during the 22d and 23d, causing great loss of life and property. These storms are described under the heading, "Local Storms" in this REVIEW. The most destructive of these was the tornado which occurred in Mississippi on the 22d, and the "Indications" issued by the signal office at 1 a. m. of the 21st, were as follows: "Warmer southeast to southwest winds, threatening weather and rain, lower barometer and violent local storms on Saturday (21st) night and Sunday (22d) morning."

After the barometric disturbance passed to the east of the Mississippi valley it became less clearly defined, but it passed eastward off the North Carolina coast, causing dangerous gales near the coast from Jacksonville, Florida, to Boston, Massachusetts. High winds also occurred at the Gulf stations and on the lakes. The observer at Toledo, Ohio, reports that the cautionary signal at that station saved \$5,000 to the fishermen of that section, and retained in port shipping valued at \$300,000.

IX.—This was a slight disturbance which developed in northern New England on the 24th, when the preceding disturbance was apparently central to the southeast of the New England coast. It moved directly eastward, with increasing energy, and was central near Sydney, Nova Scotia, on the morning of the 25th.

#### NORTH ATLANTIC STORMS DURING APRIL, 1883.

[Pressure expressed in inches and in millimeters; wind-force by scale of 0—10.]

Chart ii. exhibits the tracks of the principal depressions that have moved over the north Atlantic ocean during April, 1883. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels in the north Atlantic and from other miscellaneous data received at this office up to May 21st. The observations used are in general simultaneous, being taken each day at 7 h. 0. m. a. m., Washington, or 0 h., 8 m. p. m., Greenwich mean time.

Of the six depressions charted, two, viz.: iv. and vi., are traced as continuous storms from the United States over the ocean; but only the latter appears to have reached the European coasts. Number i. was probably a continuation of low area vii. of the March chart, while ii., iii. and v., apparently originated near the Banks of Newfoundland. Of these, v. has been traced eastward to the British Isles.

The month was in general stormy, and for the better description of the weather conditions which prevailed, may be divided into four periods. The first (1st—10th) was characterized by a continuance of moderate to strong southerly to westerly gales with cloudy or rainy weather. During the second period (11th—16th), light to moderate southwesterly to north-northeasterly breezes and fair weather generally prevailed. In the third period (16th—19th), strong westerly and northwesterly

gales with cloudy weather and rain prevailed over the Atlantic east of the thirtieth meridian, while to the westward of that meridian moderate easterly winds and fair weather obtained. During the last period (20th to close of month), the winds were variable in direction; in force they were moderate to strong, increasing frequently to moderate gales.

The following descriptions relate to the storms charted:

I.—This was probably a continuation of low area vii. of the March chart. At the close of March, an extensive area of low pressures stretched from Newfoundland to the British Isles, the region of least pressure being apparently situated near the fortieth meridian. On April 1st, the depression, having moved northeastward, was central near N. 52°, W. 34°; the s. s. "Bolivia," in N. 49° 03', W. 33° 33', reporting barometer 29.22 (742.2), wind wnw., force 6, cloudy and squally; while strong southerly and southwesterly gales of force 6 to 8 were encountered by vessels to the eastward of the "Bolivia." During the day the depression moved rapidly northeastward with apparently increasing pressure, and on the 2d it was central near N. 57°, W. 15°, causing strong southerly winds on the western coasts of Scotland and Ireland. During the 2d the disturbance probably passed to the northward of the British Isles.

II.—On the morning of the 2d the reports of vessels between N. 40° and 50° and W. 50° and 40° indicated the presence of a somewhat deep depression over the region mentioned. The s. s. "Celtic," in N. 45° 32', W. 42° 35', reported barometer 29.08 (738.6), wind se., force 8, overcast and rainy, and the s. s. "Pavonia," about 1° 30' south of the "Celtic," reported barometer 29.11 (739.4), wind s., force 8, hazy. Near W. 50°, the winds were northerly and northwesterly, force 4 to 6, and the barometric pressure ranged from 30.0 (762.0) to 30.2 (767.1). On the 3d the region of least pressures was transferred to about N. 52°, W. 29°, where the pressure ranged from 29.4 (746.7) to 29.8 (756.9). Moderate southerly gales prevailed from W. 18° eastward to W. 13°, while, in the region west of the eighteenth meridian the wind hauled to west-southwest and west, and blew with the force of a moderate gale. During the day there was a great increase of pressure east of the thirtieth meridian and the depression appears to have filled up, but another important disturbance was developing south of the Banks of Newfoundland.

III.—This was probably the most severe storm of the month, having caused great damage to vessels that encountered it. It appears to have developed near the Banks of Newfoundland during the 3d and 4th. Captain Gleadell, of the s. s. "Celtic," reported: in N. 43° 18', W. 48° 58', barometer began to fall rapidly from 8.44 a. m. of the 3d, at which time it read 30.15 (765.8), wind s., moderate breeze. At 8 p. m., wind se., increasing in force, much lightning in the west, barometer falling at the rate of .5 of an inch an hour. At 1 a. m., on the 4th, the wind fell light and veered to ne., with high sse. swell and rapidly rising swell from nnw., which caused a very high confused sea. At 3 a. m., the barometer read 28.53 (724.6), which was its lowest reading during the gale; at 4 a. m. it was blowing a hurricane, with dangerous sea, which continued until 10.30 a. m., when it began to moderate gradually, and at 8 p. m., it was blowing a strong breeze, with moderate sea, barometer 29.86 (758.4). From 3.20 a. m. to 8 p. m. the barometer rose as rapidly as it had previously fallen. The steamships "Dominion" and "Braunschweig," (near N. 42° and between W. 49° and 55°), on the 3d and 4th, both reported barometer below 29.0 (736.6), with winds veering from sse., through s., to wsw. and nw., and blowing with hurricane force. The s. s. "Notting Hill," which encountered this storm near N. 41°, W. 55°, had boats, bulwarks and deck-fittings carried away, and put into Halifax, Nova Scotia, in distress, on the 10th. Under the influence of this depression, vessels as far east as the forty-fifth meridian had strong southerly gales of force 10, while northwesterly gales, of force 8, prevailed as far westward as the sixty-fourth meridian. By the 5th, the storm centre had moved to about N. 44°, W. 45°; the pressure remained about the same

as on the preceding day and the winds showed no diminution in force; vessels near the thirtieth meridian were now brought under the influence of the disturbance and reported southerly to southwesterly gales, of force 8. By the morning of the 6th, a considerable increase of pressure occurred over the ocean and the depression apparently filled up in mid-ocean during the day. On the 6th and 7th, an area of high-pressure covered the British Isles, and extended westward to the thirty-fifth meridian.

IV.—This was probably a continuation of the depression charted as low areas i. and ii., chart i., of this REVIEW. On the 7th, there was a decrease of pressure over the Banks of Newfoundland, and on the 8th, the decrease extended northeastward to W. 40°, the lowest barometric readings being south of Newfoundland. On these dates, the winds remained moderate in force and variable in direction, but on the 9th, the barometric gradient became steeper and the winds increased in force in the western quadrants. On the 10th, the pressure increased in front of the disturbance and was accompanied by a slight increase in the force of the southerly winds which prevailed, but on the 11th, the depression disappeared; clearing weather set in and the winds moderated.

V.—On the 15th, a slight decrease of pressure occurred over the Banks of Newfoundland. During the day, the depression moved northeastward, apparently skirting the edge of an area of high-pressure which occupied the ocean between N. 40° and 50° and W. 50° and 30°. On the 16th, the centre of disturbance was north of the fiftieth parallel and near W. 40°. It moved rapidly northeastward during the day, attended by a great increase of energy, and, on the 17th, was central near N. 55°, W. 17°. Captain Schoonhoven, of the s. s. "Daniel Steinhmann," (near N. 50° and between W. 19° and 25°,) reported: from 6 p. m. of the 16th to 1.30 a. m. of the 17th, increasing sw. by s. gale with heavy rain; the wind suddenly shifted to w. and blew with great fury, accompanied by hurricane-like squalls, heavy rain, hail, and occasional snow. At 6 p. m. on the 17th, the barometer (aneroid) read 29.22 (742.2), which was its minimum reading during the storm; it then began to rise, but the wind continued to blow with unabating force from the wnw. until 2 p. m. of the 18th, when it gradually moderated to a strong breeze. On the 17th, strong westerly and northwesterly gales were reported by vessels south of N. 50° and east of W. 30°. On the 18th, the disturbance was central off the northwest coast of Ireland, causing strong southwesterly gales on the Irish and French coasts, and southeasterly gales in northern Scotland and the Scandinavian peninsula.

VI.—This was probably a continuance of the disturbance charted as low area vii. of chart i. During the 19th and 20th, the pressure remained low over the ocean, from the coasts of the United States eastward to Europe; within this area were apparently several subsidiary disturbances, the paths of which are too indefinite to admit of a tracing. On the 22d, a disturbance appeared on the eastern edge of the banks; during that day and the following, it moved eastward without developing any storm-energy and with slightly higher pressure near the centre. On the 24th, however, the area of disturbance apparently increased in dimensions; the pressure again decreased, but the winds still remained moderate in force, with cloudy and unsettled weather. On the 25th, the storm-centre appears to have moved southeastward, the region of least pressure being then near N. 47°, W. 20°. The s. s. "W. A. Scholten," in N. 49° 17', W. 19° 27', reported barometer 29.48 (748.8), wind ene., force 6, rainy; and moderate nne. to nw. gales occurred in the northwest quadrant. On the 26th, the disturbance was probably central over the Bay of Biscay, and, on the 27th, it was moving northeastward toward the English channel, causing strong southerly and easterly gales on the French coast and at the Channel stations.

#### OCEAN ICE.

Chart ii. also exhibits the southern and eastern limits of icebergs in the north Atlantic during the month of April, 1883. This chart is based on reports communicated by shipmasters to

this office; reports furnished through the co-operation of the "New York Herald Weather Service," and other data published by the "New York Maritime Register."

Reports of vessels encountering icebergs in the north Atlantic during April, 1883, are much less numerous than during the previous months. This decrease in the number of reports does not positively indicate that the number of icebergs is diminished, as it may be due to the fact that vessels have taken a more southerly course in order to avoid these dangers to navigation. The icebergs appear to have been most numerous between N. 41° 30' and 43° 30', and between W. 51° and 49°.

Compared with the chart for last month (March), it will be observed that the southern limit is about half a degree farther south, while the eastern limit is about one and one-half degrees west of that of the preceding month.

On comparison with the iceberg chart for April, 1882, the following interesting facts appear: 1st. The region within which icebergs and field-ice were observed was more extensive in April, 1882; in that month the eastern limit reached W. 41°, while in April, 1883, it extended only to W. 43°. As regards the southern limit, there was no material difference, as in both years it was between N. 40° and 41°. 2d. In April, 1882, solid field-ice extended as far south as N. 44°, while in April, 1883, no field-ice was observed in the region covered by the reports.

Icebergs were reported as follows:

1st.—S. S. "Lamington," in N. 43° 30', and between W. 48° 27' and W. 52° 14', passed five large icebergs and several smaller ones.

2d.—S. S. "Freja," arrived at New York from Havre, reported, saw but little ice on the Banks.

6th.—S. S. "Main," in N. 42° 38', W. 49° 41', passed an iceberg; also in N. 42° 46', W. 49° 23', passed two small icebergs.

7th.—S. S. "Cornwall," in N. 42°, W. 50°, passed a small iceberg; also, in N. 42°, W. 50° 30', passed a large one. The s. s. "Nettlesworth" returned to North Sydney, having had bows stove by ice when off Cape Race Rocks; s. s. "Wyoming," in N. 42° 33', W. 49° 10', passed a large iceberg.

8th.—S. S. "Alexandria," in N. 41° 50', W. 50° 20', passed two large icebergs.

10.—S. S. "Lydian Monarch," in N. 41° 54', W. 51° 05', passed an iceberg; s. s. "Iberian," in N. 42° 45', W. 50° 14', sighted several large icebergs, some apparently four hundred feet high; s. s. "Bohemia," in N. 42° 57', W. 47° 28', passed an iceberg fully two hundred feet high; s. s. "Sardinian," in N. 43° 09', W. 50° 39', passed an iceberg.

11th.—S. S. "Elbe," in N. 41° 45', W. 49° 40', passed a large iceberg and several small pieces of ice; in N. 41° 48', W. 50° 25', passed an iceberg about eighty feet above sea-level. S. S. "Germanic," in N. 41° 45', W. 49° 20', passed an iceberg; also, in N. 42° 37', W. 47° 16', passed an iceberg. S. S. "Spain," in N. 41° 30', W. 49° 55', passed a small iceberg; in N. 41° 41', W. 49° 04', passed several small pieces of ice. S. S. "Sardinian," in N. 43° 27', W. 48° 50', passed several icebergs; in N. 43° 41', W. 48° 03', passed a small iceberg, and in N. 44° 00', W. 47° 02', passed a large iceberg.

13th.—S. S. "Arizona," in N. 41° 35', W. 50° 25', passed a small iceberg.

15th.—S. S. "Belgenland," in N. 40° 59', W. 48° 36', passed an iceberg; s. s. "Rhaetia," in N. 41° 27', W. 50° 37', passed an iceberg one hundred feet high.

18th.—S. S. "Fulda," in N. 42° 54', W. 50° 15', passed two icebergs; s. s. "Jason," in N. 41° 49', W. 55° 26', passed two pieces of floating ice. Ship "Queenstown," in N. 41°, W. 47°, passed an iceberg apparently three hundred feet high.

19th.—S. S. "City of Berlin," in N. 41° 23', W. 50° 53', passed an iceberg.

23d.—S. S. "Switzerland," in N. 40° 49', W. 52° 06', passed a large iceberg; s. s. "Wieland," in N. 41° 19', W. 49° 00', passed an iceberg about one hundred and fifty feet high, drifting southward; s. s. "D. Steinmann," in N. 43° 35', W. 48° 38', passed a large iceberg.

25th.—S. S. "City of Paris," in N. 41° 35', W. 48° 32', saw

a very large iceberg; s. s. "Jersey City," in N. 43° 00', W. 50° 20', passed three icebergs.

26th.—S. S. "Katie," in N. 42° 26', W. 50° 26', passed several icebergs.

27th.—S. S. "Iowa," in N. 41° 42', W. 47° 51', passed a large iceberg.

29th.—S. S. "Devon," at New York reported, in N. 44° 00', W. 46° 10', saw three icebergs.

30th.—Ship "Jas. Drummond," in N. 43°, W. 51°, passed a large iceberg.

No date.—Bark "Dronning Sophie," from N. 48°, W. 43°, to N. 43°, W. 53°, passed numerous icebergs; ship "Thos. Rand," in N. 41° 46', W. 49° 29', passed a very large iceberg.

### TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada, for the month of April, 1883, is exhibited on chart iii., by the dotted isothermal lines.

The general distribution of mean temperature during April, and the districts of maximum departures from the April normal of each year, beginning with 1873, are as follows:

Year.	Districts.	Max. departures from normal.	Remarks.
1873		0	The temperature was from 3° to 8° below the normal at stations from Kansas and Missouri to Minnesota; from 0° to 5° below in the middle Atlantic states and lake region; from 0° to 3° below in New England and from Kentucky to the Gulf; about normal in the south Atlantic states.
1874	Upper Mississippi valley.....	-11.5	Below the normal in all districts, except in the south Atlantic states.
	Lower Mississippi valley.....	-8.4	
	South Atlantic states.....	+1.1	
	Middle Atlantic states.....	-6.8	
	Saint Lawrence valley.....	-6.6	
1875	Lower lakes.....	-4.4	Month unusually cold in all districts east of the Rocky mountains; temperature above the normal on the Pacific coast.
	Pacific coast.....	+2.6	
1876	Upper lakes.....	+2.5	Slightly below the normal on the Atlantic coast, in the lower lake region and Saint Lawrence valley; slightly above the normal in the Gulf states, the upper lake region, and in the Missouri and Ohio valleys; normal in the upper Mississippi valley.
	Missouri valley.....	+1.5	
	Lower lakes.....	-1.5	
	Pacific coast.....	-1.4	
	New England.....	-1.3	Normal on the Pacific coast and in the Gulf states; slightly below the normal in the south Atlantic states; above the normal in the other districts, the departures being most marked from the upper Missouri valley to New England.
1877	New England.....	+4.5	
	Lake region.....	+3.4	
	Upper Missouri valley.....	+3.1	
	South Atlantic states.....	-0.8	Month generally warm in all parts of the country. The greatest departures from the normal temperature occurred from the upper Missouri valley to New England. Over the Southern states and on the Pacific coast the departures are small.
1878	Upper lakes.....	+10.5	
	Lower lakes.....	+10.8	
	Minnesota.....	+9.1	
	Upper Missouri valley.....	+9.0	
	New England.....	+8.1	Above the normal in all districts west of the Mississippi river, except in Arizona; below the normal east of the Mississippi, except normal in the upper lake region.
1879	Northern slope.....	+6.0	
	Missouri valley.....	+5.1	
	Saint Lawrence valley.....	+2.9	
	Florida.....	-2.0	Above the normal from Texas and the Mississippi valley eastward, except in the Saint Lawrence valley and the Canadian maritime provinces; below the normal west of the Mississippi, except in Texas and the middle slope.
1880	Middle Atlantic states.....	+4.0	
	Eastern Gulf.....	+3.8	
	Western Gulf.....	+3.6	
	Missouri valley.....	+3.2	
	Middle Pacific coast.....	-3.0	Above the normal from the eastern Rocky mountain slope to the Pacific coast; below the normal in all other districts, except normal in the west Gulf states.
	Saint Lawrence valley.....	-2.0	
	Missouri valley.....	-3.6	
	Minnesota.....	-3.4	
	Upper lakes.....	-2.9	
1881	Upper Mississippi valley.....	-2.9	Above the normal over the southern slope, the Missouri valley, and from the Mississippi eastward, except slightly below in New England; below the normal over the northern and middle slopes and west of the Rocky mountains.
	South Atlantic states.....	-3.5	
	North Pacific coast.....	+4.0	
	Southern plateau.....	+4.6	
	Middle Pacific coast.....	+3.6	
1882	Eastern Gulf.....	+3.2	
	Tennessee.....	+2.8	
	Florida.....	+2.6	
	Middle plateau.....	-4.7	
	Middle Pacific coast.....	-3.4	
	North Pacific coast.....	-3.1	

The mean temperature of the month over the United States, as a whole, differs but slightly from the April normal, as determined from the records of the Signal Service. From the eastern Rocky mountain slope westward to the Pacific coast the

mean temperature is from less than 1° below the normal in the northern and middle slopes to 4° below the normal in the middle plateau. In the lower lake region, the middle and south Atlantic states the mean temperature is also slightly below the normal, the departures being 1° to 3° in the lower lake region, and less than 1° in the last-named districts. From the Gulf of Mexico to the northern boundary of the United States and in New England the mean temperature of the month is above the normal. Over this extended area the departure from the normal temperature is greatest in the Missouri valley, where it is 2° to 6°. In the extreme northwest, Tennessee, the upper Mississippi valley and in Florida the departures are 1° to 2°, 1° to 3°, 1° to 4° and 1° to 7° above the normal respectively. In the Gulf states, Ohio valley, upper lake region and in New England the departures above the normal are less than 1°.

The following are some of the extreme monthly mean temperatures reported from Signal-Service stations:

Stations reporting highest.	Stations reporting lowest.
Key West, Florida.....	Pike's Peak, Colorado.....
Rio Grande City, Texas.....	Mount Washington, New Hampshire.....
Punta Rassa, Florida.....	Saint Vincent, Minnesota.....
Brownsville, Texas.....	Alpena, Michigan.....
Eagle Pass, Texas.....	Mackinaw City, Michigan.....
Cedar Keys, Florida.....	Escanaba, Michigan.....
Sanford, Florida.....	Marquette, Michigan.....
New Orleans, Louisiana.....	Cheyenne, Wyoming.....
Indianola, Texas.....	Eastport, Maine.....
Galveston, Texas.....	Fort Stevenson, Dakota.....

In the first column of the following table is shown the mean temperature of April in previous years for the several districts, as determined from observations made at the Signal Service stations; the second column shows the mean temperature of April, 1883, and the third column shows the departure of April, 1883, from the normal.

Average Temperatures for April, 1883.

Districts.	Average for April. Signal Service observations.		Comparison of April, 1883, with the average for several years.
	For several years.	For 1883.	
New England.....	43.2	43.5	0.3 above.
Middle Atlantic states.....	50.6	50.1	0.5 below.
South Atlantic states.....	62.0	61.7	0.3 below.
Florida peninsula.....	72.4	74.2	1.8 above.
Eastern Gulf.....	65.5	66.3	0.8 above.
Western Gulf.....	66.9	67.4	0.5 above.
Rio Grande valley.....	72.8	73.1	0.3 above.
Tennessee.....	59.6	60.9	1.3 above.
Ohio valley.....	53.7	54.4	0.7 above.
Lower lakes.....	42.9	41.6	1.3 below.
Upper lakes.....	39.5	40.1	0.6 above.
Extreme northwest.....	37.3	38.5	1.2 above.
Upper Mississippi valley.....	50.9	52.3	1.4 above.
Missouri valley.....	48.2	50.8	2.6 above.
Northern slope.....	43.5	43.4	0.1 below.
Middle slope.....	51.6	50.7	0.9 below.
Southern slope.....	64.8	62.2	2.6 below.
Northern plateau.....	48.3	45.5	2.8 below.
Middle plateau.....	48.5	43.9	4.6 below.
Southern plateau.....	59.4	56.3	3.1 below.
North Pacific.....	50.2	48.2	2.0 below.
Middle Pacific.....	57.7	54.9	2.8 below.
South Pacific.....	61.7	59.6	2.1 below.
Mount Washington, N. H.....	20.6	20.0	0.6 below.
Pike's Peak, Colo.....	13.1	12.1	1.0 below.

### DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal-Service stations are shown in the table of average temperatures for April, 1883.

The Chief Signal Officer is indebted to voluntary observers for the following notes upon this subject. As some of these comparisons are made with the averages determined from records covering periods extending back many years before the establishment of the Signal Service, they will be found of special interest.

*Illinois.*—Riley: mean temperature 44° to 9, is 0° to 8 above the April average of the past twenty-two years.

*Anna:* mean temperature 58° to 3, is 0° to 4 above the April average of eight years.